



General

Guideline Title

Urotrauma: AUA guideline.

Bibliographic Source(s)

Morey AF, Brandes S, Dugi DD III, Armstrong JH, Breyer BN, Broghammer JA, Erickson BA, Holzbeierlein J, Hudak SJ, Pruitt JH, Reston JT, Santucci RA, Smith TG III, Wessells H. Urotrauma: AUA guideline. Linthicum (MD): American Urological Association Education and Research, Inc.; 2014 Apr. 28 p. [185 references]

Guideline Status

This is the current release of the guideline.

Regulatory Alert

FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- [December 14, 2016 – General anesthetic and sedation drugs](#) : The U.S. Food and Drug Administration (FDA) is warning that repeated or lengthy use of general anesthetic and sedation drugs during surgeries or procedures in children younger than 3 years or in pregnant women during their third trimester may affect the development of children's brains. Consistent with animal studies, recent human studies suggest that a single, relatively short exposure to general anesthetic and sedation drugs in infants or toddlers is unlikely to have negative effects on behavior or learning. However, further research is needed to fully characterize how early life anesthetic exposure affects children's brain development.

Recommendations

Major Recommendations

Definitions for the body of evidence strength (grade A, B, or C), the strength of the recommendations (Standard, Recommendation, Option), and for statements labeled as Clinical Principle and Expert Opinion are provided at the end of the "Major Recommendations" field.

Renal Trauma

1. Clinicians should perform diagnostic imaging with intravenous (IV) contrast enhanced computed tomography (CT) in stable blunt trauma patients with gross hematuria or microscopic hematuria and systolic blood pressure <90 mmHg. (*Standard; Evidence Strength Grade B*)
2. Clinicians should perform diagnostic imaging with IV contrast enhanced CT in stable trauma patients with mechanism of injury or physical exam findings concerning for renal injury (e.g., rapid deceleration, significant blow to flank, rib fracture, significant flank ecchymosis, penetrating injury of abdomen, flank, or lower chest). (*Recommendation; Evidence Strength Grade C*)
3. Clinicians should perform IV contrast enhanced abdominal/pelvic CT with immediate and delayed images when there is suspicion of renal injury. (*Clinical Principle*)
4. Clinicians should use non-invasive management strategies in hemodynamically stable patients with renal injury. (*Standard; Evidence Strength Grade B*)
5. The surgical team must perform immediate intervention (surgery or angioembolization in selected situations) in hemodynamically unstable patients with no or transient response to resuscitation. (*Standard; Evidence Strength Grade B*)
6. Clinicians may initially observe patients with renal parenchymal injury and urinary extravasation. (*Clinical Principle*)
7. Clinicians should perform follow-up CT imaging for renal trauma patients having either (a) deep lacerations (American Association for the Surgery of Trauma [AAST] Grade IV-V) or (b) clinical signs of complications (e.g., fever, worsening flank pain, ongoing blood loss, abdominal distention). (*Recommendation; Evidence Strength Grade C*)
8. Clinicians should perform urinary drainage in the presence of complications such as enlarging urinoma, fever, increasing pain, ileus, fistula or infection. (*Recommendation; Evidence Strength Grade C*) Drainage should be achieved via ureteral stent and may be augmented by percutaneous urinoma drain, percutaneous nephrostomy or both. (*Expert Opinion*)

Ureteral Trauma

- 9a. Clinicians should perform IV contrast enhanced abdominal/pelvic CT with delayed imaging (urogram) for stable trauma patients with suspected ureteral injuries. (*Recommendation; Evidence Strength Grade C*)
- 9b. Clinicians should directly inspect the ureters during laparotomy in patients with suspected ureteral injury who have not had preoperative imaging. (*Clinical Principle*)
- 10a. Surgeons should repair traumatic ureteral lacerations at the time of laparotomy in stable patients. (*Recommendation; Evidence Strength Grade C*)
- 10b. Surgeons may manage ureteral injuries in unstable patients with temporary urinary drainage followed by delayed definitive management. (*Clinical Principle*)
- 10c. Surgeons should manage traumatic ureteral contusions at the time of laparotomy with ureteral stenting or resection and primary repair depending on ureteral viability and clinical scenario. (*Expert Opinion*)
- 11a. Surgeons should attempt ureteral stent placement in patients with incomplete ureteral injuries diagnosed postoperatively or in a delayed setting. (*Recommendation; Evidence Strength Grade C*)
- 11b. Surgeons should perform percutaneous nephrostomy with delayed repair as needed in patients when stent placement is unsuccessful or not possible. (*Recommendation; Evidence Strength Grade C*)
- 12a. Surgeons should repair ureteral injuries located proximal to the iliac vessels with primary repair over a ureteral stent, when possible. (*Recommendation; Evidence Strength Grade C*)
- 12b. Surgeons should repair ureteral injuries located distal to the iliac vessels with ureteral reimplantation or primary repair over a ureteral stent, when possible. (*Recommendation; Evidence Strength Grade C*)
- 13a. Surgeons should manage endoscopic ureteral injuries with a ureteral stent and/or percutaneous nephrostomy tube, when possible. (*Recommendation; Evidence Strength Grade C*)
- 13b. Surgeons may manage endoscopic ureteral injuries with open repair when endoscopic or percutaneous procedures are not possible or fail to adequately divert the urine. (*Expert Opinion*)

Bladder Trauma

- 14a. Clinicians must perform retrograde cystography (plain film or CT) in stable patients with gross hematuria and pelvic fracture. (*Standard; Evidence Strength Grade B*)
- 14b. Clinicians should perform retrograde cystography in stable patients with gross hematuria and a mechanism concerning for bladder injury, or in those with pelvic ring fractures and clinical indicators of bladder rupture. (*Recommendation; Evidence Strength Grade C*)
15. Surgeons must perform surgical repair of intraperitoneal bladder rupture in the setting of blunt or penetrating external trauma. (*Standard; Evidence Strength Grade B*)
16. Clinicians should perform catheter drainage as treatment for patients with uncomplicated extraperitoneal bladder injuries. (*Recommendation; Evidence Strength Grade C*)
17. Surgeons should perform surgical repair in patients with complicated extraperitoneal bladder injury. (*Recommendation; Evidence Strength Grade C*)
18. Clinicians should perform urethral catheter drainage without suprapubic (SP) cystostomy in patients following surgical repair of bladder injuries. (*Standard; Evidence Strength Grade B*)

Urethral Trauma

19. Clinicians should perform retrograde urethrography in patients with blood at the urethral meatus after pelvic trauma. (*Recommendation; Evidence Strength Grade C*)
20. Clinicians should establish prompt urinary drainage in patients with pelvic fracture associated urethral injury. (*Recommendation; Evidence Strength Grade C*)
21. Surgeons may place suprapubic tubes (SPTs) in patients undergoing open reduction internal fixation (ORIF) for pelvic fracture. (*Expert Opinion*)
22. Clinicians may perform primary realignment (PR) in hemodynamically stable patients with pelvic fracture associated urethral injury. (*Option; Evidence Strength Grade C*) Clinicians should not perform prolonged attempts at endoscopic realignment in patients with pelvic fracture associated urethral injury. (*Clinical Principle*)
23. Clinicians should monitor patients for complications (e.g., stricture formation, erectile dysfunction, incontinence) for at least one year following urethral injury. (*Recommendation; Evidence Strength Grade C*)
24. Surgeons should perform prompt surgical repair in patients with uncomplicated penetrating trauma of the anterior urethra. (*Expert Opinion*)
25. Clinicians should establish prompt urinary drainage in patients with straddle injury to the anterior urethra. (*Recommendation; Evidence Strength Grade C*)

Genital Trauma

26. Clinicians must suspect penile fracture when a patient presents with penile ecchymosis, swelling, cracking or snapping sound during intercourse or manipulation and immediate detumescence. (*Standard; Evidence Strength Grade B*)
27. Surgeons should perform prompt surgical exploration and repair in patients with acute signs and symptoms of penile fracture. (*Standard; Evidence Strength Grade B*)
28. Clinicians may perform ultrasound in patients with equivocal signs and symptoms of penile fracture. (*Expert Opinion*)
29. Clinicians must perform evaluation for concomitant urethral injury in patients with penile fracture or penetrating trauma who present with blood at the urethral meatus, gross hematuria, or inability to void. (*Standard; Evidence Strength Grade B*)
30. Surgeons should perform scrotal exploration and debridement with tunical closure (when possible) or orchiectomy (when non-salvageable) in patients with suspected testicular rupture. (*Standard; Evidence Strength Grade B*)
31. Surgeons should perform exploration and limited debridement of non-viable tissue in patients with extensive genital skin loss or injury from infection, shearing injuries, or burns (thermal, chemical, electrical). (*Standard; Evidence Strength Grade B*)
32. Surgeons should perform prompt penile replantation in patients with traumatic penile amputation, with the amputated appendage wrapped in saline-soaked gauze, in a plastic bag and placed on ice during transport. (*Clinical Principle*)

Definitions:

Body of Evidence Strength

Grade A: Well-conducted and highly-generalizable randomized controlled trials (RCTs) or exceptionally strong observational studies with consistent findings

Grade B: RCTs with some weaknesses of procedure or generalizability or generally strong observational studies with consistent findings

Grade C: Observational studies that are inconsistent, have small sample sizes, or have other problems that potentially confound interpretation of data

Note: By definition, Grade A evidence is evidence about which the Panel has a high level of certainty, Grade B evidence is evidence about which the Panel has a moderate level of certainty, and Grade C evidence is evidence about which the Panel has a low level of certainty.

American Urological Association (AUA) Nomenclature Linking Statement Type to Evidence Strength

Standard: Directive statement that an action should (benefits outweigh risks/burdens) or should not (risks/burdens outweigh benefits) be taken based on Grade A or B evidence

Recommendation: Directive statement that an action should (benefits outweigh risks/burdens) or should not (risks/burdens outweigh benefits) be taken based on Grade C evidence

Option: Non-directive statement that leaves the decision regarding an action up to the individual clinician and patient because the balance between benefits and risks/burdens appears equal or appears uncertain based on Grade A, B, or C evidence

Clinical Principle: A statement about a component of clinical care that is widely agreed upon by urologists or other clinicians for which there may or may not be evidence in the medical literature

Expert Opinion: A statement, achieved by consensus of the Panel, that is based on members' clinical training, experience, knowledge, and judgment for which there is no evidence

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Urologic trauma

Guideline Category

Diagnosis

Evaluation

Management

Treatment

Clinical Specialty

Radiology

Surgery

Intended Users

Physicians

Guideline Objective(s)

- To guide clinicians in the appropriate methods of evaluation and management of genitourinary injuries
- To review the existing literature pertaining to the acute care of urologic injuries in an effort to develop effective guidelines for appropriate diagnosis and intervention strategies in the setting of urotrauma

Target Population

Patients with urotrauma

Interventions and Practices Considered

Diagnosis/Evaluation

1. Imaging with intravenous (IV) contrast enhanced computed tomography (CT)
2. Observation
3. Follow-up CT
4. Laparotomy
5. Retrograde cystography
6. Retrograde urethrography
7. Surgical exploration
8. Ultrasound

Management/Treatment

1. Immediate intervention (surgery or angioembolization in selected situations)
2. Ureteral stent
3. Urinary drainage
4. Percutaneous nephrostomy
5. Repair of traumatic ureteral lacerations
6. Ureteral reimplantation
7. Open repair
8. Urethral catheter drainage with or without suprapubic (SP) cystostomy
9. Suprapubic tubes (SPTs) in patients undergoing open reduction internal fixation (ORIF)
10. Primary realignment (PR)
11. Scrotal exploration and debridement with tunical closure
12. Orchiectomy
13. Penile replantation
14. Monitoring for complications

Major Outcomes Considered

- Sensitivity, specificity, and accuracy of diagnostic tests
- Incidence and rate of complications
- Urinary function

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

A comprehensive search of the literature using the MEDLINE® and EMBASE databases targeted the five main urotrauma topics within the scope of this guideline. The search used an extensive list of keywords related to renal, ureteral, bladder, urethral, and genital trauma. A full list of keywords and the search strategy are available on request. This search covered articles published between January 1990 and September 2012. Study designs consisting of randomized controlled trials (RCTs), controlled clinical trials (CCTs), and observational studies (diagnostic accuracy studies, cohort with and without comparison group, case-control, case series) were included. Systematic reviews were included if they performed a quantitative analysis of data that did not overlap with data from other included studies; otherwise they were retrieved only for hand-searches of their bibliographies.

The following publications and study types were excluded: preclinical studies (e.g., animal models), meeting abstracts, commentary, editorials, non-English language studies, pediatric studies (except for specific key questions associated with renal trauma, ureteropelvic junction [UPJ] trauma and bladder neck/urethral trauma), and studies of urethral and genital injuries that did not separately analyze data from males and females. Studies with less than 10 patients were excluded from further evaluation and thus data extraction given the unreliability of the statistical estimates and conclusions that could be derived from them.

Number of Source Documents

The review yielded an evidence base of 372 studies after application of inclusion/exclusion criteria.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Body of Evidence Strength

Grade A: Well-conducted and highly-generalizable randomized controlled trials (RCTs) or exceptionally strong observational studies with consistent findings

Grade B: RCTs with some weaknesses of procedure or generalizability or generally strong observational studies with consistent findings

Grade C: Observational studies that are inconsistent, have small sample sizes, or have other problems that potentially confound interpretation of data

Note: By definition, Grade A evidence is evidence about which the Panel has a high level of certainty, Grade B evidence is evidence about which the Panel has a moderate level of certainty, and Grade C evidence is evidence about which the Panel has a low level of certainty.

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

Quality of Studies and Determination of Evidence Strength

Quality of individual studies was rated as high, moderate, or low based on instruments tailored to specific study designs. Randomized controlled trials (RCTs) were assessed using the Cochrane Risk of Bias tool. Conventional diagnostic cohort studies, diagnostic case-control studies, or diagnostic case series that presented data on diagnostic test characteristics were assessed using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) tool that evaluates the quality of diagnostic accuracy studies. Cohort studies with a comparison of interest were evaluated with the Drug Effectiveness Review Project instrument. There is no widely agreed upon quality assessment tool for case series that do not present data on diagnostic test characteristics, thus the quality of individual case series was not formally assessed with an instrument. Instead, these studies were labeled as low quality due to their study design.

The categorization of evidence strength is conceptually distinct from the quality of individual studies. Evidence strength refers to the body of evidence available for a particular question and includes consideration of study design, individual study quality, consistency of findings across studies, adequacy of sample sizes, and generalizability of samples, settings, and treatments for the purposes of the guideline. The American Urological Association Education and Research, Inc. (AUA) categorizes body of evidence strength as Grade A (well-conducted RCTs or exceptionally strong observational studies), Grade B (RCTs with some weaknesses of procedure or generalizability or generally strong observational studies), or Grade C (observational studies that are inconsistent, have small sample sizes, or have other problems that potentially confound interpretation of data). Because most of the available evidence consisted of low quality case series, the majority of evidence was considered Grade C.

Limitations of the Literature

The Panel proceeded with full awareness of the limitations of the urotrauma literature. These limitations include heterogeneous patient groups, small sample sizes, lack of studies with diagnostic accuracy data, lack of RCTs or controlled studies with patient outcome data, and use of a variety of outcome measures. Overall, these difficulties precluded use of meta-analytic procedures or other quantitative analyses. Instead, narrative syntheses were used to summarize the evidence for the questions of interest.

Methods Used to Formulate the Recommendations

Expert Consensus

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

The Panel was created by the American Urological Association Education and Research, Inc. (AUA). The Practice Guidelines Committee (PGC) of the AUA selected the Panel Chair and Vice Chair who in turn appointed the additional panel members, all of whom have specific expertise with regard to the guideline subject.

Linking Statement Type to Evidence Strength

The AUA nomenclature system explicitly links statement type to body of evidence strength and the Panel's judgment regarding the balance between benefits and risks/burdens (see the "Rating Scheme for the Strength of the Recommendations" field).

In some instances, the review revealed insufficient publications to address certain questions from an evidence basis; therefore, some statements are provided as *Clinical Principles* or *Expert Opinions* with consensus achieved using a modified Delphi technique if differences of opinion emerged. A *Clinical Principle* is a statement about a component of clinical care that is widely agreed upon by urologists or other clinicians for which there may or may not be evidence in the medical literature. *Expert Opinion* refers to a statement, achieved by consensus of the Panel, that is based on members' clinical training, experience, knowledge, and judgment for which there is no evidence.

Rating Scheme for the Strength of the Recommendations

American Urological Association (AUA) Nomenclature Linking Statement Type to Evidence Strength

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Expert Opinion: A statement, achieved by consensus of the Panel, that is based on members' clinical training, experience, knowledge, and judgment for which there is no evidence

Cost Analysis

A cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Peer Review

Description of Method of Guideline Validation

The American Urological Association Education and Research, Inc. (AUA) conducted an extensive peer review process. The initial draft of this Guideline was distributed to 69 peer reviewers of varying backgrounds; 35 responded with comments. The panel reviewed and discussed all submitted comments and revised the draft as needed.

Once finalized, the Guideline was submitted for approval to the Practice Guidelines Committee (PGC). It was then submitted to the AUA Board of Directors for final approval. The Guideline was approved by the AUA Board of Directors in April 2014.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Where evidence was lacking, recommendations are supported by expert opinion or consensus.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate evaluation and management of patients with urotrauma

Potential Harms

- Risks of computed tomography (CT) include contrast related complications, radiation exposure, and the dangers of transporting a patient away from the resuscitation environment into the CT scanner.
- Risks of renal stenting include risk of injury during placement, risk of anesthesia, or risk of retained stent through lack of follow-up.

Contraindications

Contraindications

Immediate operative intervention in patients with straddle injury to the anterior urethra is contraindicated due to the indistinct nature of the injury border.

Qualifying Statements

Qualifying Statements

- While these guidelines do not necessarily establish the standard of care, American Urological Association Education and Research, Inc. (AUA) seeks to recommend and to encourage compliance by practitioners with current best practices related to the condition being treated. As medical knowledge expands and technology advances, the guidelines will change. Today these evidence-based guidelines statements represent not absolute mandates but provisional proposals for treatment under the specific conditions described in each document. For all these reasons, the guidelines do not pre-empt physician judgment in individual cases.
- Treating physicians must take into account variations in resources, and patient tolerances, needs, and preferences. Conformance with any clinical guideline does not guarantee a successful outcome. The guideline text may include information or recommendations about certain drug uses ("off label") that are not approved by the U.S. Food and Drug Administration (FDA), or about medications or substances not subject to the FDA approval process. AUA urges strict compliance with all government regulations and protocols for prescription and use of these substances. The physician is encouraged to carefully follow all available prescribing information about indications, contraindications, precautions and warnings. These guidelines and best practice statements are not intended to provide legal advice about use and misuse of these substances.
- Although guidelines are intended to encourage best practices and potentially encompass available technologies with sufficient data as of close of the literature review, they are necessarily time-limited. Guidelines cannot include evaluation of all data on emerging technologies or management, including those that are FDA-approved, which may immediately come to represent accepted clinical practices.
- For this reason, the AUA does not regard technologies or management which are too new to be addressed by this guideline as necessarily experimental or investigational.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Morey AF, Brandes S, Dugi DD III, Armstrong JH, Breyer BN, Broghammer JA, Erickson BA, Holzbeierlein J, Hudak SJ, Pruitt JH, Reston JT, Santucci RA, Smith TG III, Wessells H. Urotrauma: AUA guideline. Linthicum (MD): American Urological Association Education and Research, Inc.; 2014 Apr. 28 p. [185 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2014 Apr

Guideline Developer(s)

American Urological Association Education and Research, Inc. - Medical Specialty Society

Source(s) of Funding

Funding of the committee was provided by the American Urological Association, Inc. (AUA). Committee members received no remuneration for their work.

Guideline Committee

Urotrauma Guidelines Panel

Composition of Group That Authored the Guideline

Panel Members: Allen F. Morey, MD (*Chair*), UT Southwestern Medical Center, Dallas, TX; Steve Brandes, MD (*Vice Chair*), Washington University Medical Center, Saint Louis, MO; John H. Armstrong, MD, FACS, USF Health Simulation Center, Tampa, FL; Benjamin N. Breyer, MD, University of California, San Francisco, San Francisco, CA; Joshua A. Broghammer, MD, University of Kansas Medical Center, Kansas City, KS; Daniel David Dugi III, MD, Oregon Health and Science University, Portland, OR; Bradley A. Erickson, MD, University of Iowa Hospitals and Clinics, Iowa City, IA; Jeff Holzbeierlein, MD (PGC Rep), Kansas University Medical Center, Kansas City, KS; Steven J. Hudak, MD, UT Southwestern Medical Center, Dallas, TX; Jeffrey H. Pruitt, MD, UT Southwestern Medical Center, Dallas, TX; Richard A. Santucci, MD, Detroit Medical Center, Detroit, MI; Thomas G. Smith III, MD, Baylor College of Medicine, Houston, TX

Financial Disclosures/Conflicts of Interest

Conflict of Interest (COI) Disclosures

All panel members completed COI disclosures. Relationships that have expired (more than one year old) since the panel's initial meeting, are listed. Those marked with (C) indicate that compensation was received; relationships designated by (U) indicate no compensation was received.

Consultant or Advisor: Jeffrey M. Holzbeierlein, Janssen (C); Allen F. Morey, MD, American Medical Systems (C)

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Scientific Study or Trial: Steven B. Brandes, MD, Allergan (U); Joshua A. Broghammer, MD, Trauma Urologic Reconstructive Network (U), Hunter Wessells, MD, National Institutes of Health (U)

Other: Joshua A. Broghammer, MD, American Medical Systems (C); Hunter Wessells, MD, National Institutes of Health (U)

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the [American Urological Association, Inc. \(AUA\) Web site](#) .

Availability of Companion Documents

None available

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on September 8, 2014. The information was verified by the guideline developer on September 30, 2014. This summary was updated by ECRI Institute on February 15, 2017 following the U.S. Food and Drug Administration advisory on general anesthetic and sedation drugs.

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